Dynamics of Physically Adsorbed Layers

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Mole fractions of dimers and trimers of ^{4}He in a free jet expansion, as a function of source temperature T_0 and pressure P_0. The formation of these clusters is a critical step in the formation of the liquid by homogeneous nucleation. The symbols denote data from diffraction experiments with a transmission nanograting. The solid lines are obtained from a kinetic model that incorporates estimates of three-body recombination processes at very low collision energies. For most of the source temperatures and pressures shown here the relative kinetic energies of atoms in the final state of the expanded beam correspond to temperatures of 1 to 10 mK. *[from L. W. Bruch, W. Schoellkopf, and J. P. Toennies, J. Chem. Phys. (in press).]*

The scaled pressure-temperature combination will give an exact scaling for an isentropic expansion. The departures in the plots show the extent to which the expansion departs from thermodynamic equilibrium.

Education: One graduate student and one postdoctural student participated in this project.